

# Range extension of the Cubozoan, *Tripedalia binata* Moore (Cnideria: Carybdeida: Carybdeidae) from far north Queensland, Australia.

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## ABSTRACT

The occurrence of *Tripedalia binata*, a small species of carybdeid jellyfish previously known in Australia only from specimens collected in the Northern Territory, is recorded from three new locations in North Queensland. Photographic documentation of the morphology of *T. binata* is also presented herein. □ *Tripedalia binata*, cubozoan, range, jellyfish, carybdeid, morphology.

Box jellyfish of the order Carybdeida, are defined as having a single tentacle per pedalum with the majority of species having one pedalia on the each corner of the bell. However, notable exceptions are members of the bitypic genus *Tripedalia*, which display additional interradial pedalia, each extending to a single tentacle. The first species attributed to the genus, and after which it is aptly named, is *Tripedalia cystophora* Conant, 1897, with three undivided pedalia per corner. This species has been recorded from tropical mangrove areas world-wide (Conant 1897; Stiasny 1926; Werner 1973), the most recent record from Lake Wyman in Florida, USA (Orellana & Collins 2011). In 1988, a second species within the genus was identified as *Tripedalia binata* Moore due to its characteristic paired interradial pedalia (Moore 1988). To date, records for *T. binata*

indicate a limited species distribution within Australia, with all known samples collected from the near-shore waters around the Darwin region (Moore 1988). Two additional samples have been recorded from the Jambu River in India (Moore 1988).

In this paper we detail five new records of *T. binata* from the north Queensland areas of Cairns, Innisfail and Weipa (Fig.1) thus increasing the known range of this species for Australia. Two of these specimens have been lodged at the Tropical Museum of Queensland, Townsville (MTQ G66685). In addition, we verify and supplement the original species description and drawings by Moore (1988) with photographs of morphological characteristics. We further highlight the types of environment in which *T. binata* is found,



FIG. 1. Distribution map for *Tripedalia binata* in Australia showing previously known records (◆) and documenting new distributional records (●).

suggesting that its actual distribution is considerably wider than is currently described.

### AUSTRALIAN DISTRIBUTION

**Record 1.** In October 2002, a single male specimen was found in a mangrove lined creek approximately 13 km from the mouth of the Barron River, Cairns (16°52'24.96"S, 145°41'9.99"E). The specimen had an interpedalia distance (IPD, Fig.1) of 7.5 mm and a niche-bell height (NB, Fig.1) of 7.5 mm.

**Record 2.** A single female specimen (IPD: 9mm, NB:8.5mm) was collected at Thomatis Creek, Cairns approximately 5km from the river mouth (16°51'4.93"S, 145°43'3.44"E) on the 15<sup>th</sup> October 2002.

**Record 3.** One of the authors was called to an aquaculture facility in Mourilyan, 5k south of Innisfail, QLD (17°35'56.53"S, 146

°6'7.63"E), on 14<sup>th</sup> October 2008 to identify a number of box-shaped jellyfish. The animals had been found in an aquaculture pond following drainage of the facility. The pond in question had initially been filled 5 months previously, with water pumped directly into the pond from an adjacent tidal creek. Given that the incoming water had been pumped through a 200 micron mesh filter, we believe that the planula or polyp stage of *T. binata* rather than the medusae were introduced into the pond from the external water source. A total of 5 animals were collected and identified as *T. binata* (IPD (mm), NB (mm); 7,7; 9,9; 9,10; 10,5,12; 11,11; 8,5,9; 8,9. respectively). As the specimens did not display developed gametes, sex determination was not possible.

**Record 4.** In November 2011 a single female specimen (IPD 13.5 mm, NB 11 mm) was collected in the shallows of Red Beach, Mapoon (GPS

12°01'6.28"S, 141°54'16.5"E) on the western side of Cape York. The following November, three additional *T. binata* specimens (IPD(mm), NB(mm); 13,10; 10,9; 9,8.5 respectively) were collected at the same location. Sex determination was not possible due to lack of gonad material, possibly through spawning prior to collection or during transportation back to the lab. The specimens were observed swimming within a large aggregation of another cubozoan species, *Chironex fleckeri*, located in knee-deep water within 1 meter of the shore-line, at the southern end of a sandy beach near mangrove habitat.

### MORPHOLOGY

The following characteristics observed in the collected specimens are concurrent with the published description (Moore 1988): pedalia arranged in pairs at each of the 4 interradial corners of the bell (Figs 2, 3) ending in a single tentacle (Figs 2, 3); velarium with 7-8 velarial canals per quadrant (Fig. 4); the bell is covered in randomly dispersed bell warts of nematocyst type atrichous isorhizas (Figs 1, 5, 6); nematocyst on the tentacles were identified as stenoteles and atrichous isorhizas; 4 rhopalial niches on the bell containing visual sensory structures (Figs 2, 5); the stomach is located in the bell apex connecting to the perradial canals (Fig. 6); brush-like bundles of gastric phacellae are present in the 4 corners of the stomach (Fig. 6); gonad sheaths extend from the top of the bell to the velarium (Figs 2, 6). The manubrium extends mid-way down the centre of the bell and in contraction is double cruciform in appearance (Figs 4, 6). However, on further dissection and in a more relaxed state it proves to be a single piece of tissue or a simple cruciform as originally described (Moore 1988). The pattern of nematocyst banding on the tentacles is of one larger band then one smaller band repeated along the length of the tentacle (Fig.7).

Maximum tentacle length could not be accurately measured due to contraction during

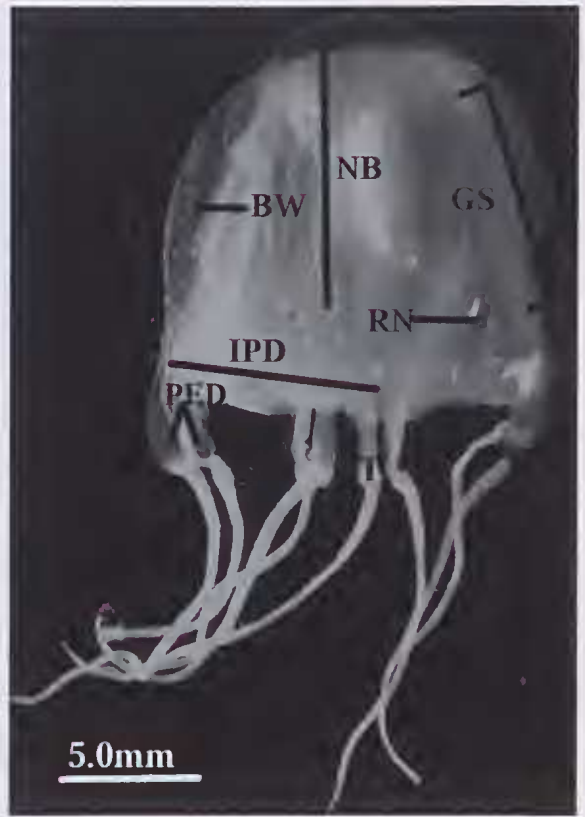


FIG. 2. Whole preserved specimen of *Tripedalia binata*. Lateral view. NB, niche-bell height; IPD, inter-pedalia distance; BW, bell warts containing nematocysts; RN, rhopalial niche containing sensory structures; GS, gonad sheaths (undeveloped in this specimen); T, tentacles containing bands of nematocysts; PED, pedalia.

preservation of the specimens. In the specimen identified as female, eggs could be seen throughout the bell (Fig. 3) including behind the rhopalial niche and extending into the velarial and pedalia canals. In the male specimens, gonad material also filled most of the interior of the animal (Fig. 8). Although sexual dimorphism is a defining characteristic of the family Tripedalidae (Conant 1897), to which *T. binata* belongs, there is no evidence of male seminal vesicles in *T. binata* as evident in the two other species of this family, *T. cystophora* and *Copola sivickisi*. Additional male specimens are needed to verify this.



FIG. 3. Paired pedalia of mature female *Tripedalia binata*. PED, pedalia; PC, pedalial canal; EG, eggs.

#### ECOLOGY AND DISTRIBUTION

In the original description of *Tripedalia binata*, it was stated that this species was found in mangrove-lined creeks and beaches (Moore

1988). The location of the new specimens recorded above appears to substantiate this observation, with the majority of specimens closely associated with mangrove habitats.



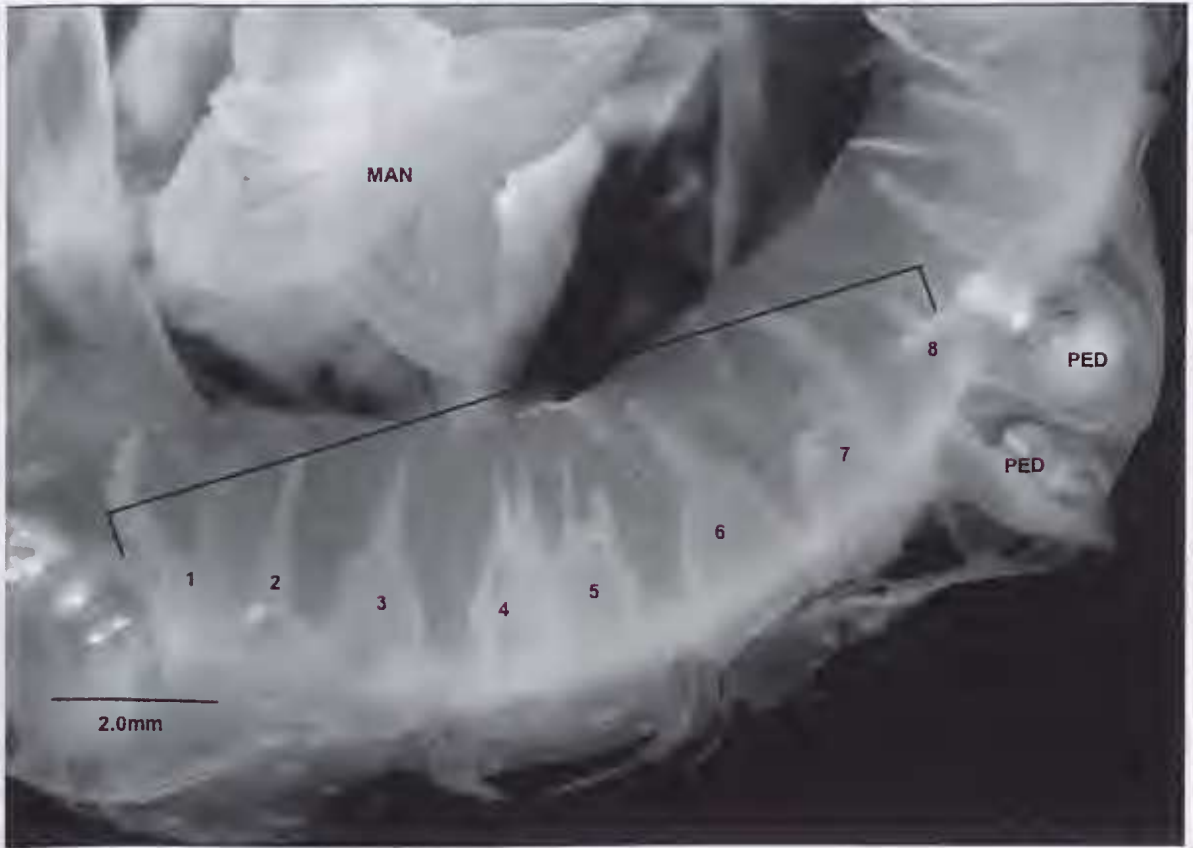


FIG. 4. Velarium and interior of bell of *Tripedalia binata*. MAN, manubrium; P, location of pedalia (removed at base in specimen for enhanced visibility of internals); VC, velarial canals. Numbers 1-8 indicate the number of velarial canals per quadrant.

Even where the specimens were collected from aquaculture ponds, the water in which they were found had been pumped directly from a mangrove-lined creek adjacent to the facility. Given this extended range, it would be reasonable to assume that *T. binata* should be present in other localities of Tropical Australia under similar habitat conditions. However, as with the majority of cubozoan species, this could be problematic to verify given the difficulty in visually spotting these small, transparent and highly mobile animals.

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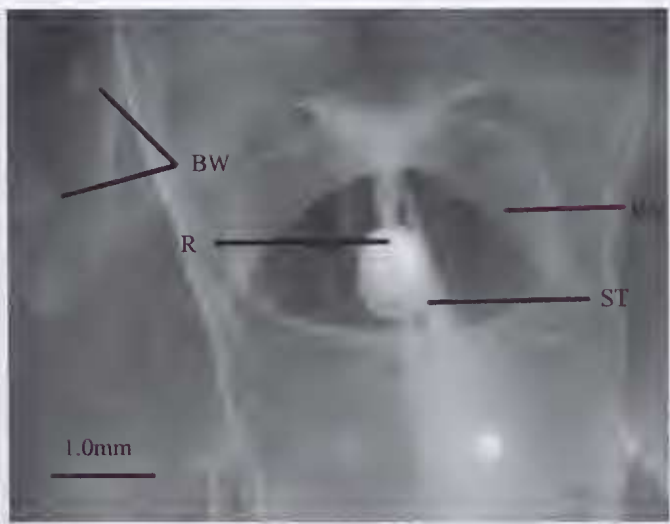


FIG. 5. Sensory structures of *Tripedalia binata*. RN, rhopalial niche; R, rhopalia; ST, statolith; RH, viking-like rhopalial horns; BW, bell warts containing nematocysts.



FIG. 6. Dorsal view of internal structures of *Tripedalia binata*; MAN, maubrium; GS, gonad sheaths; GP, gastric phacellae.



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FIG. 7. Tentacles of *Tripedalia binata* displaying nematocyst banding pattern of consecutive small and larger bands.



FIG. 8. Sexually mature male *Tripedalia binata*.